

South Dakota AFNR

Academic Integration Activities: Example #5

→ *Natural Resources students identify lines of symmetry that exist in nature.*

1. Ag Standard

Natural Resources—NR4.3

Recognize insect types and available controls to prevent insect infestation.

- > Classify insects into their proper family groups.
- > Recognize damage created by insects by observing various examples of infestation.
- > Discuss emerald ash borer.
- > Describe mountain pine beetle infestation.

2. Academic Standard

9-12.G.2.2

Students are able to reflect across vertical or horizontal lines and translate two-dimensional figures.

- > Identify lines of symmetry.

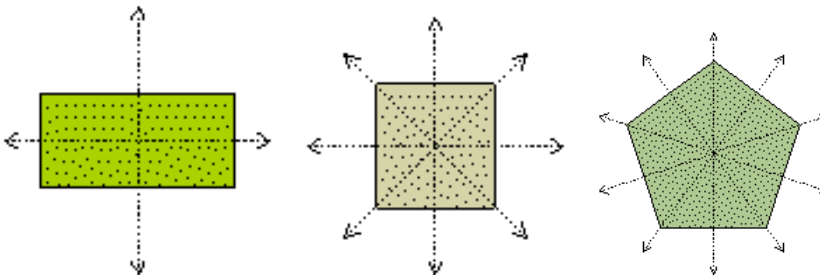
3. Background Information

A line of symmetry divides a figure into two congruent halves. (Congruent means similar, matching, or fitting.)

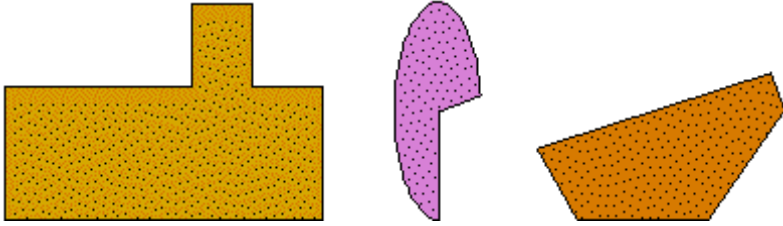
How to Find Lines of Symmetry

- a. Look for midpoints in the shape.
- b. Use a ruler to draw a straight line through the estimated midpoint.
- c. Fold the shape in half to see if both sides match. If they do, it is a line of symmetry.

A rectangle has two lines of symmetry because there are two ways to divide the shape into two congruent halves. A square has four lines of symmetry because there are four ways to divide the shape into two congruent halves. A regular pentagon has five lines of symmetry.



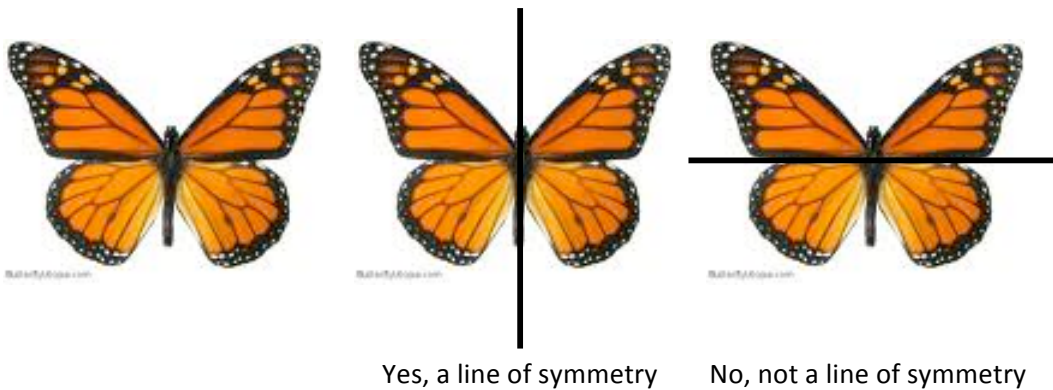
There are shapes that have no lines of symmetry. Here are some examples:



4. Example in Context

Students are studying the insect Order Lepidoptera (butterflies). They review how to determine lines of symmetry. Then they use their geometry skills to identify the symmetrical portions of the insects.

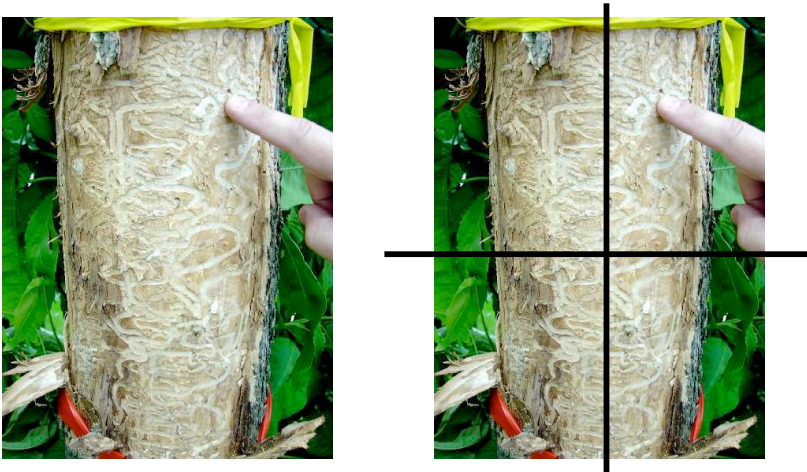
Students are pinning butterflies for their collection. How many lines of symmetry does this Monarch Butterfly have?



Answer: One line of symmetry. The insect can be divided into two congruent (matching) halves if a line is drawn down the midsection. This is bilateral symmetry. There are not two lines of symmetry because a horizontal line does not split the insect into two congruent sides.

5. Guided Practice Exercise

Students are discussing the insect Emerald Ash Borer. They examine images of trees that have been damaged by the beetle. How many lines of symmetry does the infested ash tree have?



Answer: None. There are no lines that can be drawn on the tree to create two congruent (similar) sides. Emerald Ash Borers do not follow a certain pattern when they bore into ash trees. Therefore, the path created will not have lines of symmetry.

6. Independent Practice Exercises

Students are describing mountain pine beetle infestation and are learning to properly identify and classify the insect. They recognize the lines of symmetry that exist within the Order Coleoptera.

How many lines of symmetry does the mountain pine beetle have?



Answer: One line of symmetry. Drawing one bilateral line creates two congruent (similar) sides.

Students are learning to recognize insect damage in various plants. While viewing healthy and infested pictures of leaves, they note the lines of symmetry that exist.

How many lines of symmetry are there in healthy leaves and in infested leaves?



Answer: Healthy leaves have one line of symmetry. Leaves that have been damaged by insects have no lines of symmetry because of the holes that have been created.

7. Notes

Lines of symmetry appear frequently in nature and could teach geometry in a variety of ways:

- > Diagram lines of symmetry on worksheets.
- > Identify lines of symmetry in the insects they classify and collect.
- > Recognize or rule out the possibility of symmetrical lines in leaves, trees, etc.